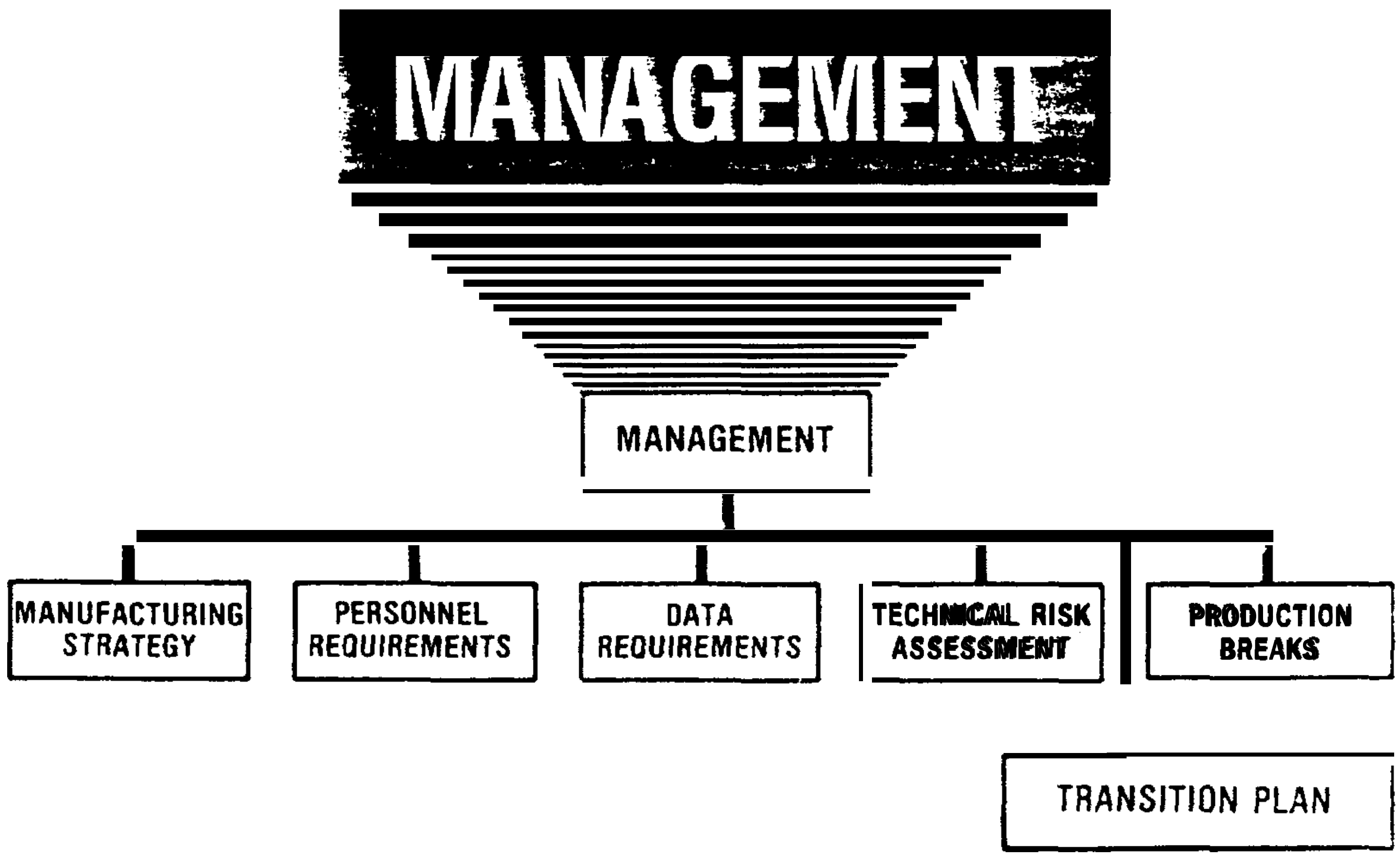

MANAGEMENT
MANAGEMENT
MANUFACTURING STRATEGY
PERSONNEL REQUIREMENTS
DATA REQUIREMENTS
TECHNICAL RISK ASSESSMENT
PRODUCTION BREAKS
TRANSITION PLAN

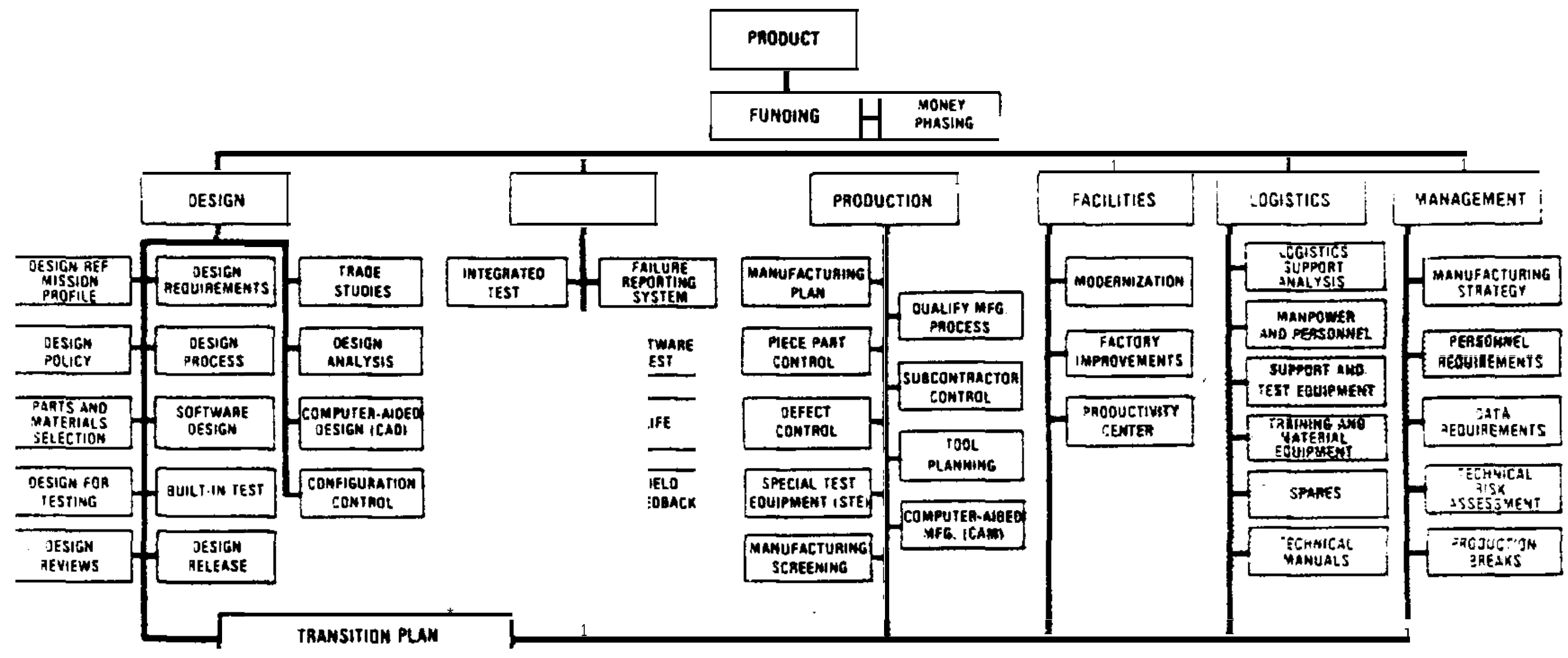
CHAPTER 9

INTRODUCTION FOR MANAGEMENT CRITICAL PATH TEMPLATES

Our free enterprise system relies heavily on the law of supply and demand. When a supplier has the capability to make a product for which there is sufficient consumer demand, the resources of both the supplier and the customer are applied to ensure that the product is delivered for the price agreed upon, is received on or before the desired date, and performs the required functions. The risk drivers in this process include the quality and experience of the people assigned to the project. More specifically, the industry supplier must have the people resources to design, test, and produce an acceptable end item. To ensure that customer requirements, and any necessary changes thereto during the acquisition process, are communicated effectively to the supplier, the Government also must have competent people resources to provide clear direction and evaluate progress throughout the process.

Without adequate numbers of competent people in industry and Government, there is an extremely high risk of having an unacceptable product. Although material and time are very important resources requiring effective management, people are the key to a successful program.

TEMPLATE



MANUFACTURING STRATEGY

AREA OF RISK

One of the first tasks for the newly assigned program manager is the development of an overall acquisition strategy. Construction of the program acquisition strategy without due consideration to the manufacturing elements is a key area of risk to the capability of the industrial base meeting the schedule, performance, and quality desired of the end item. If the principal contractors do not know what is expected of them by the Government, they will be uncertain and reluctant to make the proper financial and personnel resource decisions necessary for facilitization, industrial modernization, labor commitments, subcontractor or vendor structure, and foreign and domestic technology and production sharing agreements. Inadequate and unnecessarily imprecise production planning information increases program risk to the contractors and adds delay and indifference to industrial market participation in the program. Resulting inefficiencies will increase substantially production and support costs.

OUTLINE FOR REDUCING RISK

- A manufacturing strategy as specified by DoD Directive 4245.6 (reference (h)) is outlined by the program manager as part of the initial acquisition strategy. The manufacturing strategy is refined progressively during the program's conceptual phase so that a sound, comprehensive manufacturing approach is available for dissemination with the solicitations for the development effort.

- Demands on the industrial base will be discernible readily from stated inventory objectives, operational capability dates, initial production requirements, delivery profiles, and production surge requirements.

- Maintenance, logistics, mobilization, and surge planning information enables assessing the demands on production capacity from spares and test and support equipment requirements.

- Use of strategic and critical materials and vendor manufacturing capabilities is projected, including offshore requirements.

- Critical manufacturing technologies needed to efficiently produce the concept and the design are identified and pursued through appropriate RDT&E projects.

- Peculiar system and component manufacturing test equipments are scheduled for development and use.

- The contracting scheme is compatible with program risk and needed levels of Government visibility and control.

- The contractors are aware fully of Government plans for dual sourcing and "breakout" of Government-furnished equipment so that rights in data and technology transfer issues are resolved expeditiously, Procurement of necessary technical data is an integral part of the development effort.

- The Government manufacturing strategy is translated readily into contractor production and transition planning documents that convincingly show the contractors' appreciation of and capability to respond to the magnitude and complexity of the manufacturing effort and their willingness to participate in mobilization, surge, and productivity enhancement projects.

- Production matters are weighted heavily in engineering development source selection evaluations and the contractors are so informed.

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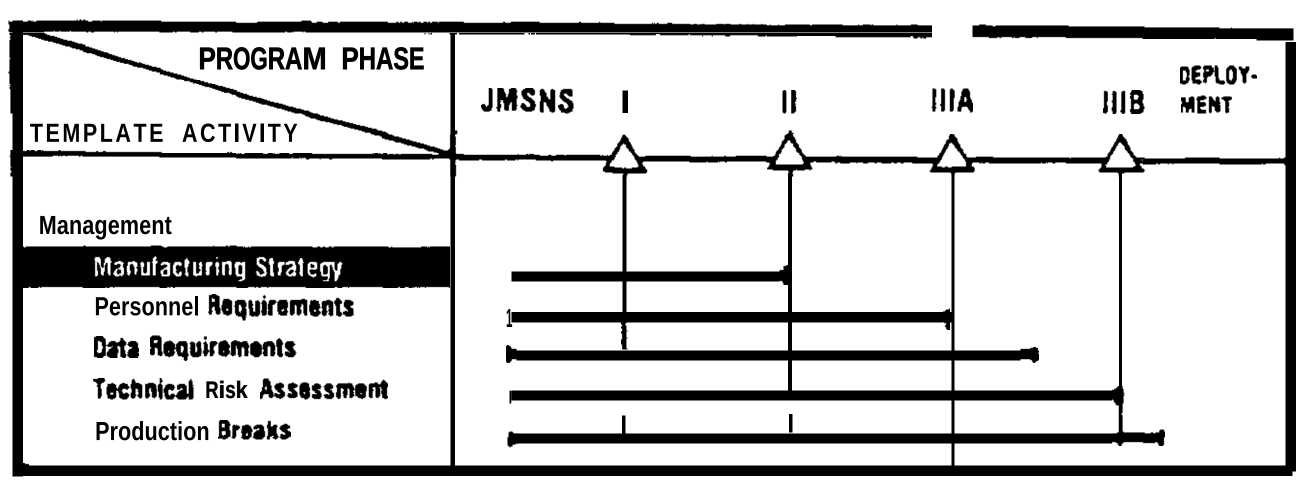

A manufacturing strategy should be developed at the initiation of program development to reduce risk while meeting cost, schedule, performance, and quality of the production items. As development progresses, the manufacturing strategy should be refined and updated so that a sound manufacturing approach is in place at the start of production.

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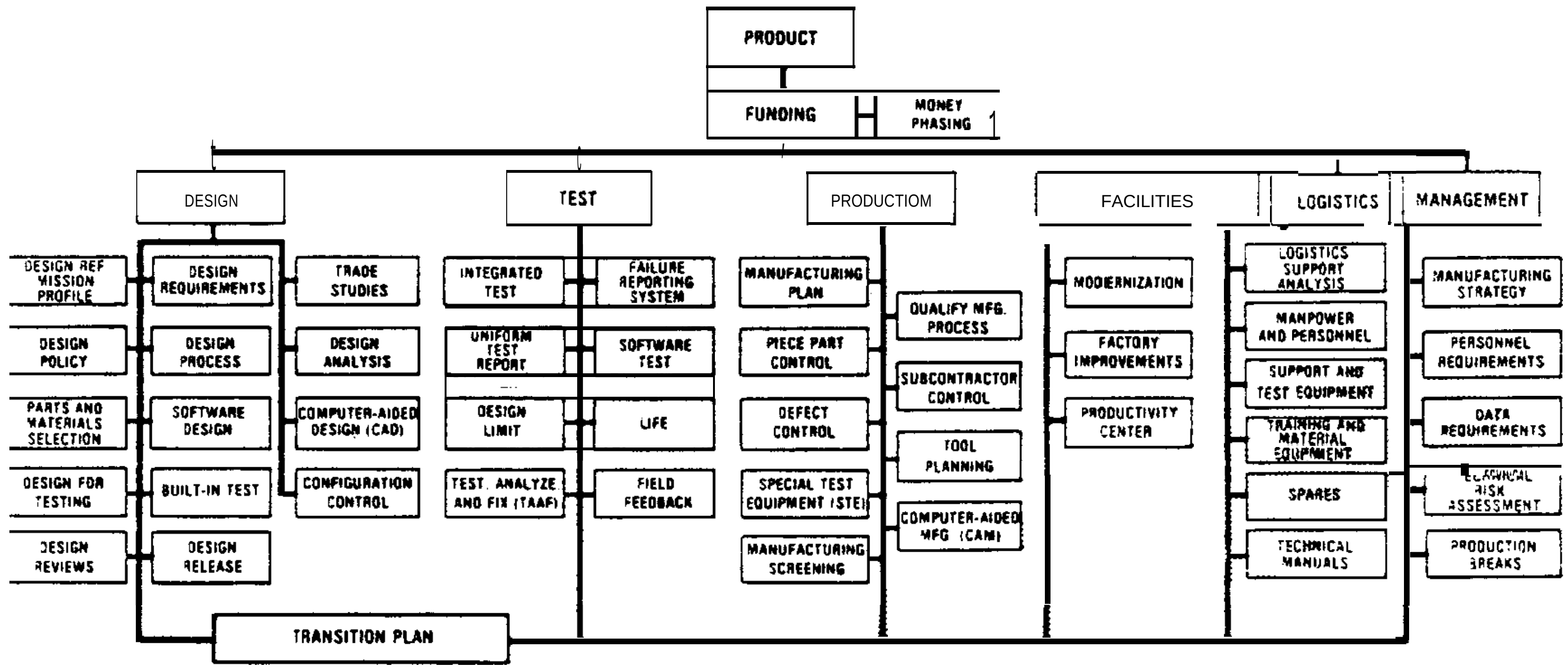

PERSONNEL REQUIREMENTS

AREA OF RISK

It is a common practice in both industry and Government for program managers to be supported by a small number of key staff personnel collocated in the program office and by a large number of functional area experts who provide their support using a matrix management approach. Contractor program managers may lack the experience to orchestrate the entire effort from drawing board to finished product. Government program managers may likewise lack acquisition experience and proven leadership ability, and tour lengths are often too short to see the program through to completion. Engineering and manufacturing talent may lack critical continuity and corporate knowledge. For example, design engineering may be left to recent college graduates because the more experienced design engineers have been promoted to new fields of endeavor. Functional support personnel are also in the critical path, and the recruitment, training, and retention of competent, experienced personnel may not be a continuing corporate objective. History has proven that those programs for which Government or industry top managers only gave lip service to the precept that states "people are our most important resource" have suffered and often failed.

OUTLINE FOR REDUCING RISK

- Career progressions are defined for prospective program managers, and available formal training such as the Defense Systems Management College and informal training such as training with industry programs (for DoD personnel) are used.
- program manager tours are extended and stabilized, particularly in the Department of Defense, and civilian program managers are used in the Department of Defense on a selected basis. Stability considerations argue strongly against changing program managers and key staff and functional support personnel at major program milestones.

. A program manager never is assigned more than one major program.

● The use of matrix management, a proven concept, is coupled with as much collocation of key functional support personnel as practical.

● Line managers are involved in the recruitment, training, and retention of key technical personnel rather than delegating all such responsibility to the personnel support organization. To provide DoD line managers with greater control over personnel functions, innovative techniques, such as the Civil Service experiment being conducted at the Naval Weapons-Center (NWC), China Lake, and Naval Ocean Systems Center (NOSC), San Diego, are considered.

. Personnel with production experience are critical particularly in Government organizations because manufacturing operations usually are contracted with industry. Career development and training programs with a production orientation are supported zealously by the Military Services, and program managers ensure that their personnel attend or have commensurate experience.

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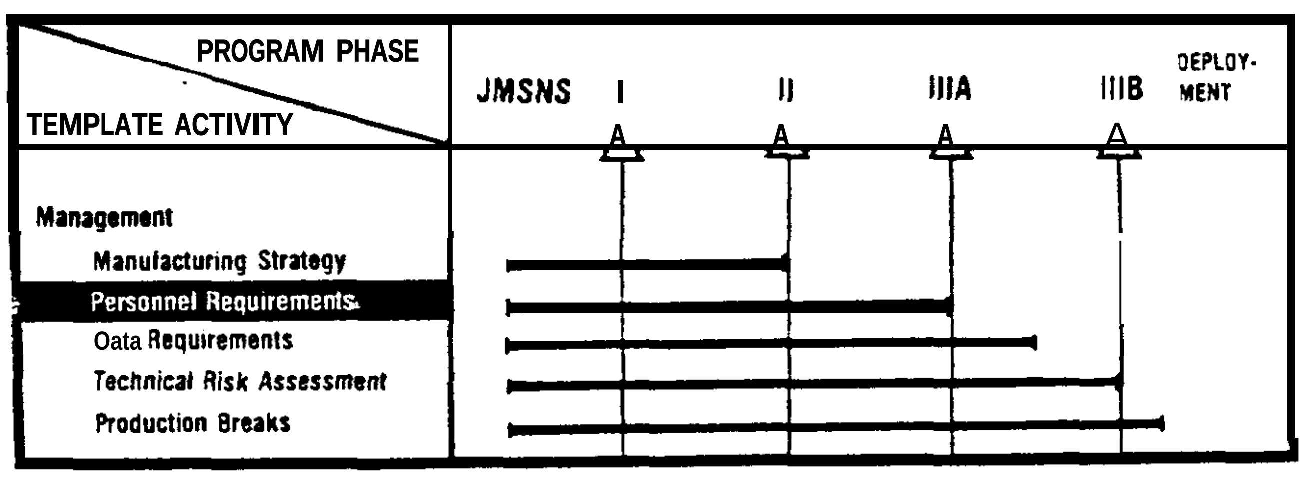
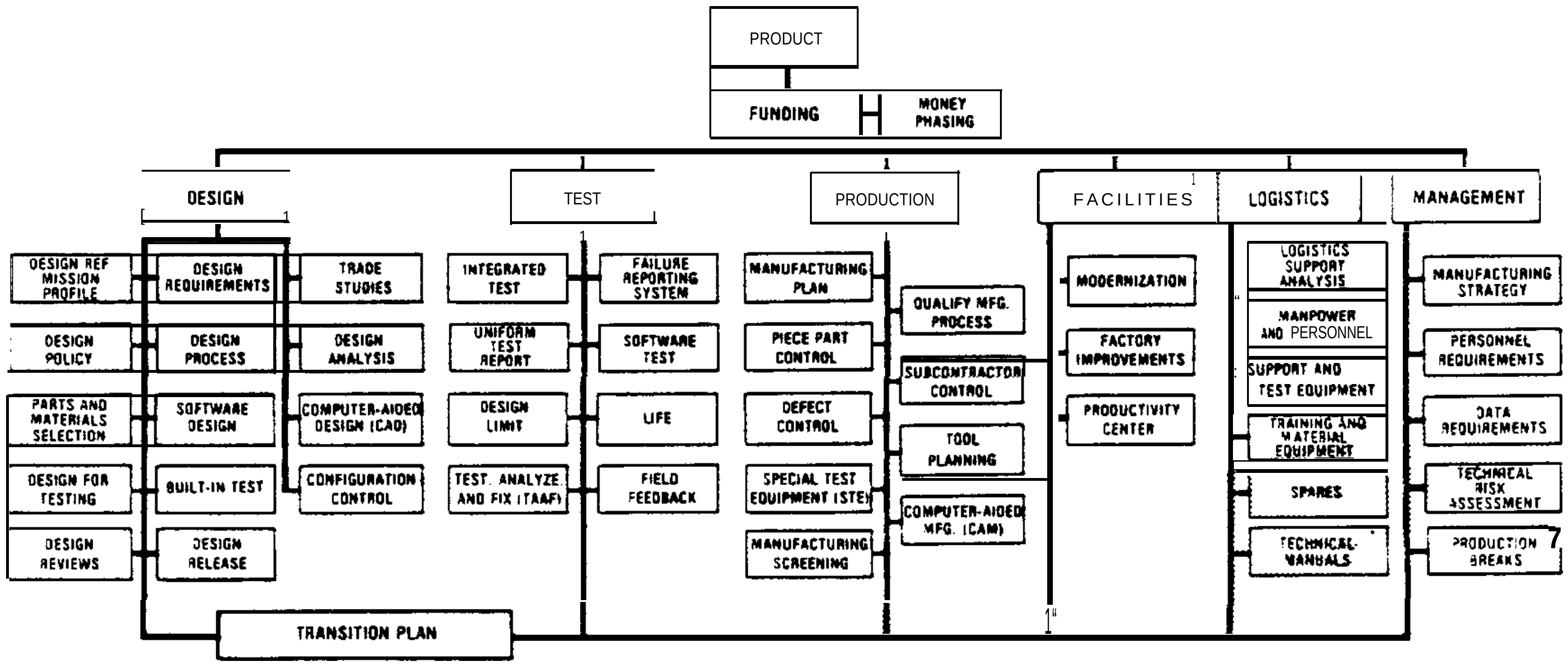


Personnel resources are the key determinant of successor failure throughout the life cycle of any program. To recruit, train, and retain the people necessary to ensure success, it is essential that Government and industry couple effective management and sound leadership during every program phase, including the transition from development to production.

TEMPLATE



DATA REQUIREMENTS

AREA OF RISK

The Government asks for too much technical data in their procurements, which increases the risk of cost overruns. Redundant data also may be procured by different Government functional organizations and the program office that did not coordinate their data requirements before contract definition. Often, this is a direct result of using a boilerplate list of data requirements when the request is submitted by the various Government offices responsible for the procurement. It is estimated that direct costs for data range from 6 to 20 percent of contracts, not including the overhead costs and the cost to the Government to process, review, and manage the data. A corollary problem is the degree to which any potentially useful data is evaluated and introduced into the decision making process. On the one hand, too much data is required and, on the other, not enough data is used for better program control. Control of data requirements has been sporadic at best and, even though the problem of poor data management has been identified in various studies over the past 20 years, it receives little emphasis because of little top level commitment.

OUTLINE FOR-REDUCING RISK

- All procurement data requirements are reviewed using an effective data review board before contract award, to ensure that the data received will satisfy the Government's needs, is in a format suitable for customer use, and is not redundant.
- An integrated data management system is established both in Government and industry for each major procurement. The objective is to tailor the technical data requirements to the needs of each program.
- Electronic data transfer is used. Pertinent data required by the Government can be requested by accessing the customer data base. The requested data can then be exercised in the Government's data base to extract the required information.

- The data requirements for a major program are reviewed at a level high enough to ensure that redundant data is not being requested by the different disciplines within the program office and its functional support organizations.

- Technical data libraries are established for ease of data retrieval, and the data is kept current.

- Data requirements are reviewed during each phase of the program to ensure that data being procured meets the needs of that particular program phase.

- Data is procured using well-defined data requirements lists, reasonable cost estimates, and realistic schedules.

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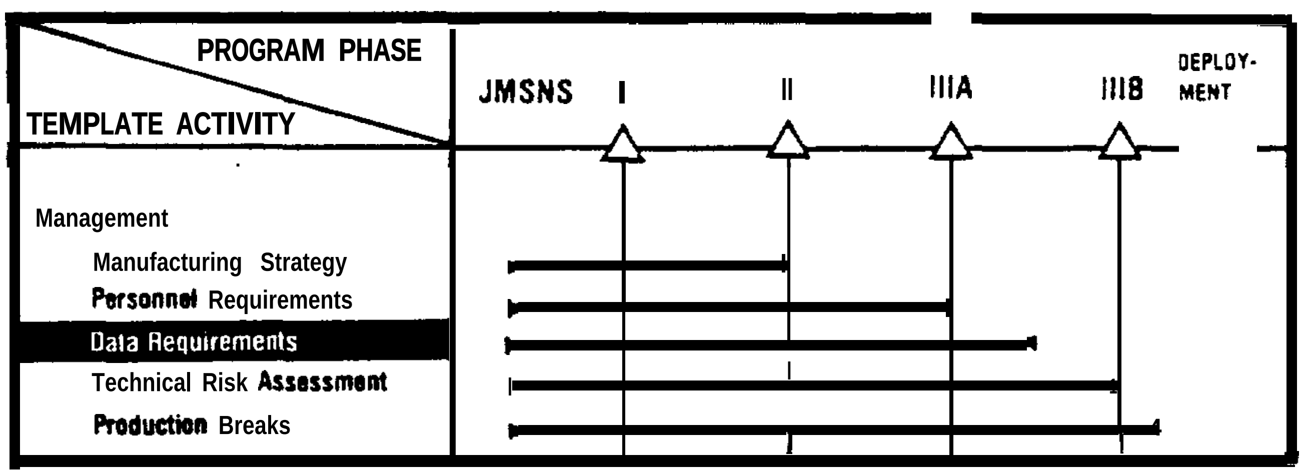
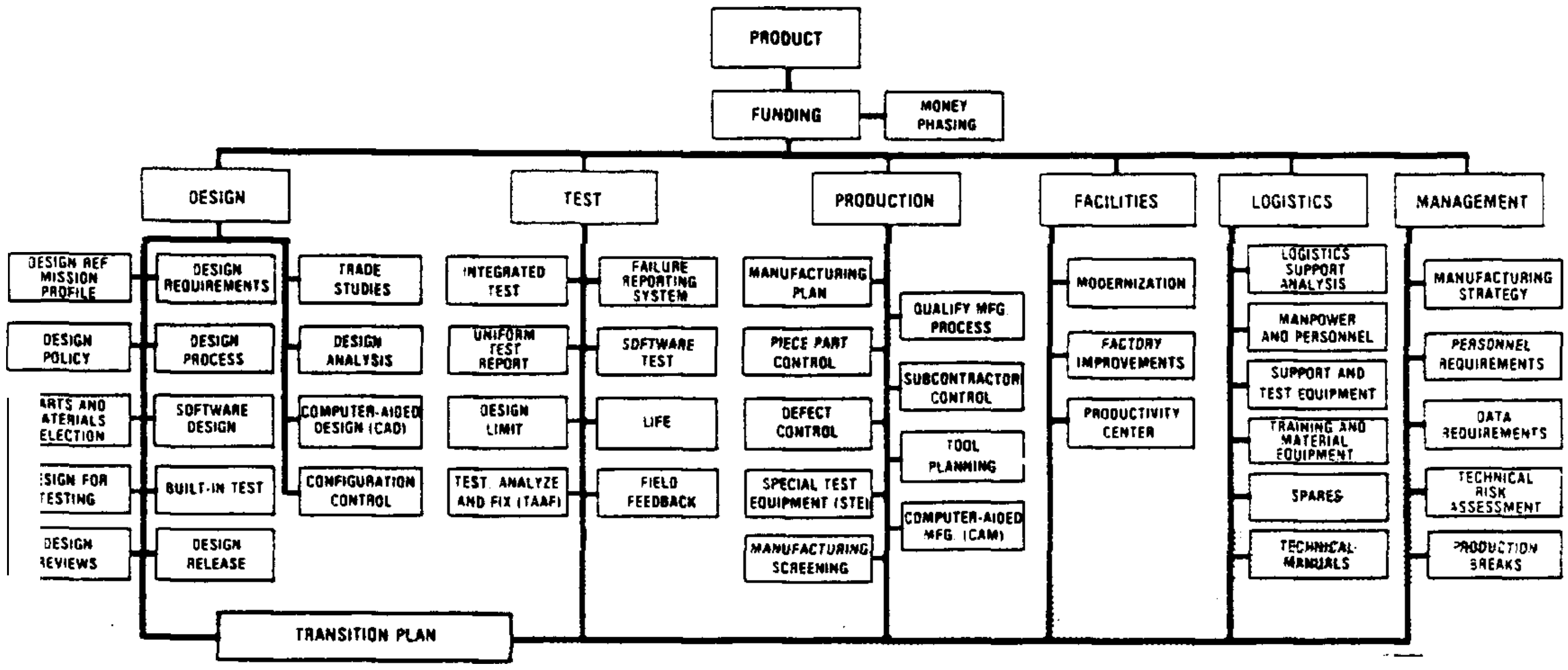


Useful data, properly applied during the decision making process, will ensure that the system being procured meets all the technical requirements and that the necessary reprocurement information is available when needed. An integrated data management plan . developed at the start of the program and approved at the appropriate management level, should lay out the technical data requirements for ail phases of the program to reduce - management risks.



TECHNICAL RISK ASSESSMENT

AREA OF RISK

The track record of major defense systems acquisitions has been poor over the past several years, as manifested by the length of the acquisition cycle, the unsatisfactory levels of effectiveness, and the pressure to reduce life cycle costs. In spite of numerous attempts to improve the management-oriented Defense System Acquisition Review process, the lack of consistent and predictable success has resulted in renewed interest in upgrading the process by an infusion of technical discipline. The 1981 DoD Acquisition Improvement Program not only identified the root cause of acquisition problems to be “uncertainty” but also called for increasing DoD efforts to quantify risk and for expanding the use of budgeted funds to deal with uncertainty. Since risk and the degree of uncertainty are synonymous and directly proportional to the seriousness of the acquisition problems faced by Government and industry program managers, why have many years of alleged emphasis on technical risk assessment achieved so few results? It must be concluded that management ignorance of technical risk assessment is itself a major source of risk in the transition from development to production.

OUTLINE FOR REDUCING RISK

- Technical risk management is specified as a contractual requirement, and early implementation in the development process is required.
- All areas of risk are identified as early as possible in the development cycle. A specific set of tracking indicators is determined for each major technical element (design, test, and production) as well as for cost and management.
- Plans are developed to track, measure, assess, and adjust for identified risks using a disciplined system that can be applied by managers from a variety of positions

within the Government and the contractor organizations. This system provides a continuous assessment of program health against quantifiable parameters.

- Risk drivers are understood adequately by contractors, using qualified design and production engineers knowledgeable of the risk drivers, to identify and reduce program technical risks.
- Technical problems are highlighted before they become critical.
- Hasty shortcuts are avoided, mission profiles are reviewed, and existing analysis tools are used while implementing the technical risk assessment system.
- Test programs are structured to verify that high risk design areas have been resolved.

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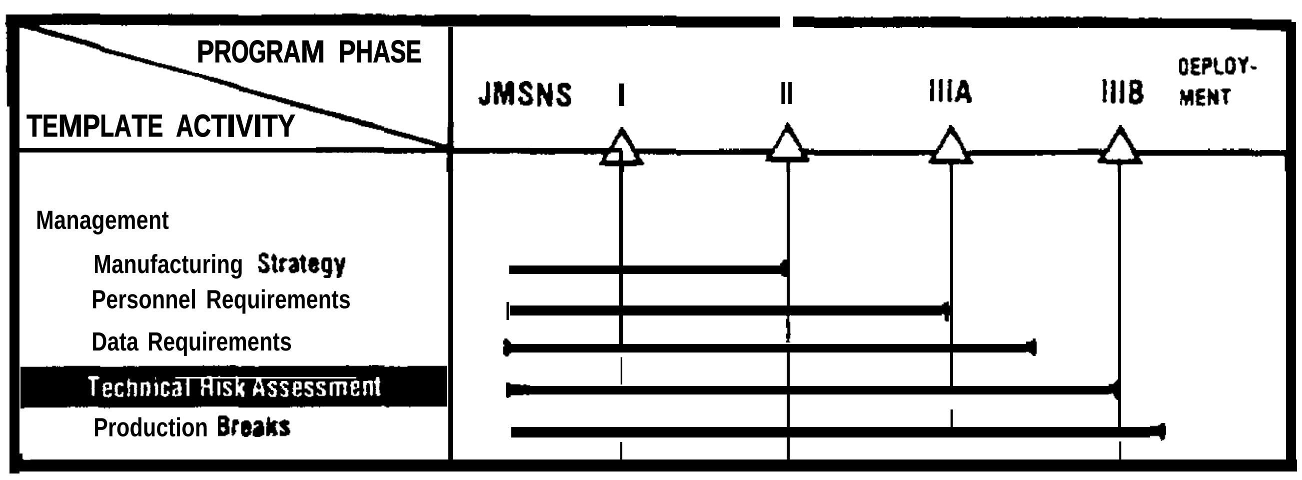
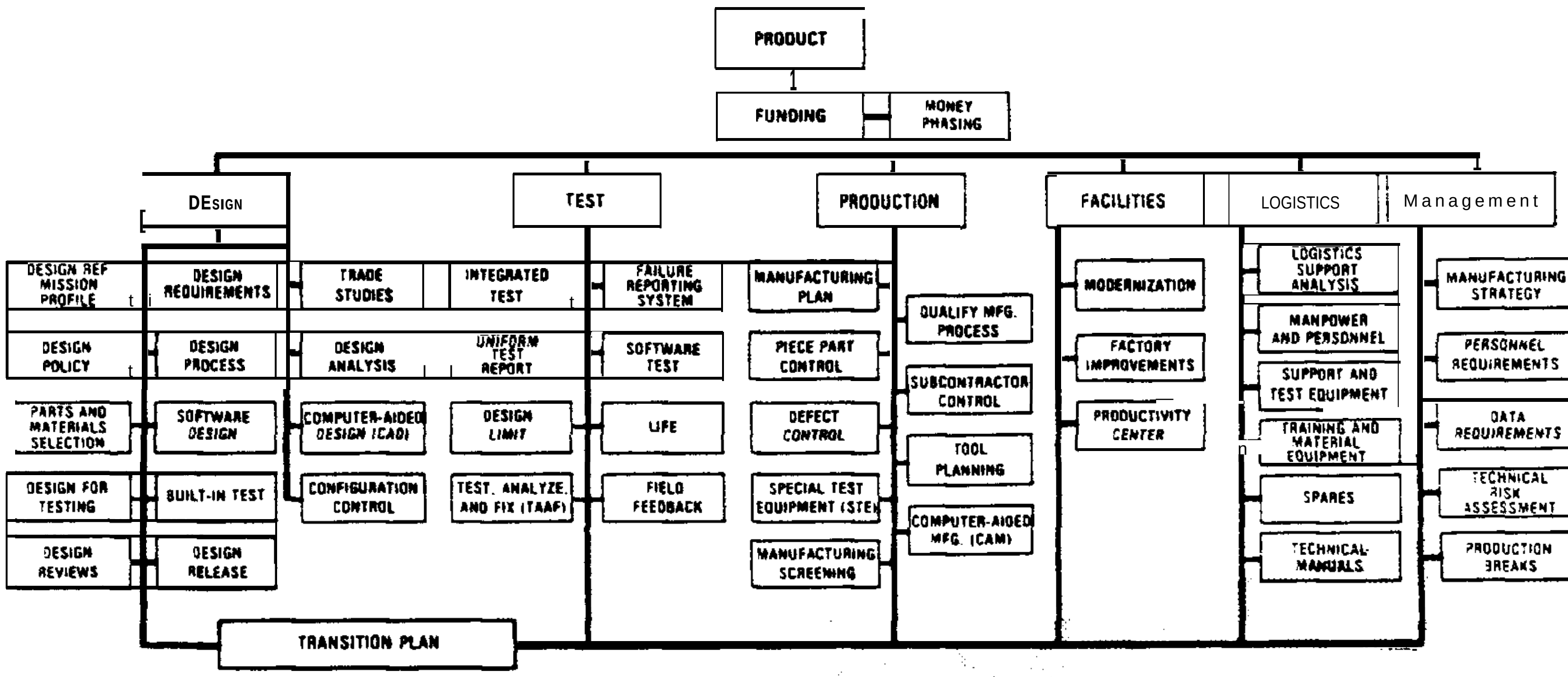


A technical risk assessment system should provide all levels of management with (1) a disciplined system for early identification of technical uncertainties, (2) a tool for instantaneous assessment of current program status, and (3) early key indicators of potential success or failure. To be effective, a technical risk assessment system should be initiated at the start of the program and function throughout the development and production phases.

TEMPLATE



PRODUCTION BREAKS

AREA OF RISK

Changes in production schedule range from reduced delivery rate (stretchout) to a complete shutdown of the production line (production break). Stretchouts and production breaks increase both technical risk and cost. Factory space, tooling, and equipment are idled, and in the worst case, may be eliminated. Publications and handbooks lose currency. Production flow is interrupted and benefits from assembly improvements and automation are lost. Experienced manufacturing and engineering personnel are either reassigned or dismissed. Morale suffers, teamwork is less apparent, problem identification and resolution become much more difficult to reestablish, and production efficiency degrades noticeably. Design improvements are less effective and less timely. Small suppliers and vendors whose orders represent much larger percentages of their total business are less able to adjust, and in the worst case, even sole source suppliers and vendors have been forced out of business.

OUTLINE FOR REDUCING RISK

- Experience has shown that the classic result of a production break is as illustrated in figure 9-1. The ideal solution, of course, is never to permit a break to occur. However, when the realities of the budget process increase the potential for a Government-mandated production break, understanding the impact might help the arguments for softening such a decision or preventing it from being made at all.

- The loss of learning that often includes a loss of process capability results in an overall program cost increase and a higher quantity of units produced before unit cost reaches the value it would have been without a break in production. A significant reduction in production rate, to a “misery rate” level, has similar effects. To prepare a case for modifying a production break decision, use the following method to compute the cost of the loss of learning (see figure 9-1 .):

- Determine value of learning for improvement before the break or **stretchout.**

– Determine percentage loss of learning for duration of break or **stretchout** and compute new cost of first unit produced after break or return to original production rate.

– Locate the new point for initial unit cost following break/return to original production rate. This point will correspond to the same quantity along the abscissa that existed just before the break/reduction in rate.

— Develop the new forecast learning curve for the continuation of production.

– Loss of learning cost is the difference between the cost of producing the quantity of units following the break or **stretchout** versus the cost of the same quantity without the break or **stretchout.**

● **Use** of **multiyear** contracting minimizes the risk of production breaks or **stretchout.**

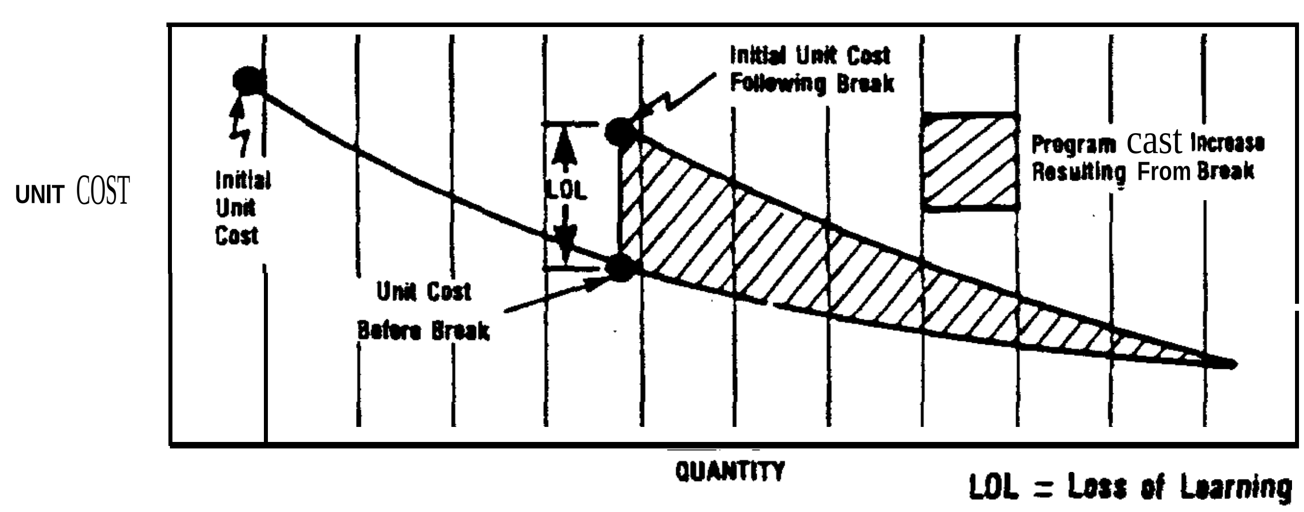
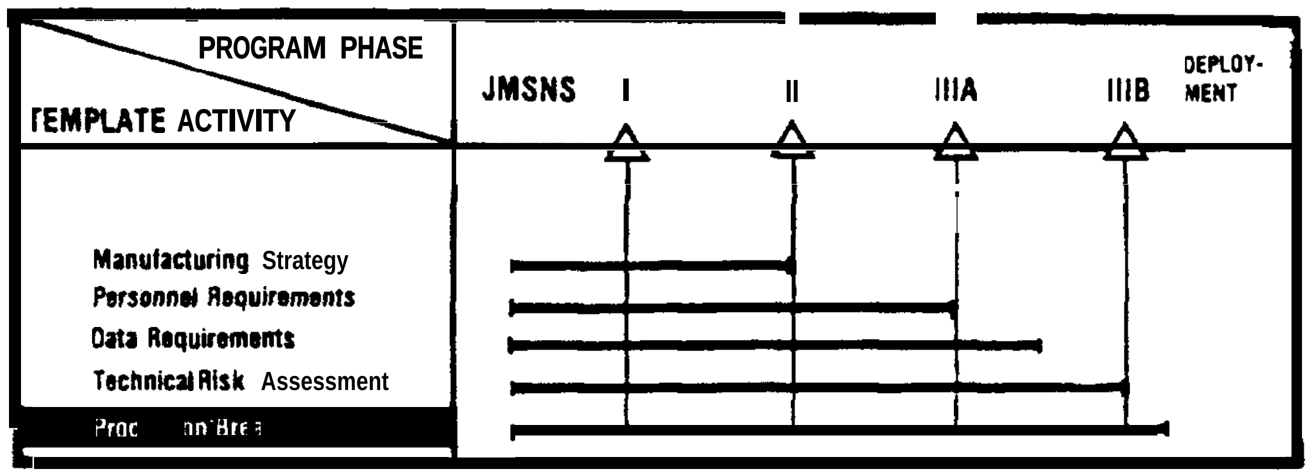


Figure 9-1. Production **Break Impact** on Learning Curve

TIMELINE



The increase in production efficiency and attendant reduction in unit cost reflects the benefits of an uninterrupted learning curve, that is, no break in production, starting with initial production at Milestone IIIA.